NewsRelease

National Aeronautics and
Space Administration

Langley Research Center
Hampton, Virginia 23681-2199

Chris Rink
(757) 864-6786

Julia Cole
(757) 864-4052

Goddard Institute for Space Studies
(212) 678-5500

For Release: EMBARGOED
NOT FOR RELEASE
UNTIL 2 P.M. EST,
JAN. 31, 2002

RELEASE NO. 02-009

FEWER CLOUDS FOUND IN TROPICS

NASA scientists discover new evidence of climate change

After examining 22 years of satellite measurements, NASA researchers find that more sunlight entered the tropics and more heat escaped to space in the 1990s than in the 1980s. Their findings indicate less cloud cover blocked incoming radiation and trapped outgoing heat.

"Since clouds were thought to be the weakest link in predicting future climate change from greenhouse gases, these new results are unsettling," said Dr. Bruce Wielicki of NASA Langley Research Center, Hampton, Va. Wielicki is the lead author of the first of two papers about this research appearing in the Feb. 1, issue of “Science.”

"It suggests that current climate models may, in fact, be more uncertain than we had thought,” Wielicki added. “Climate change might be either larger or smaller than the current range of predictions."

The observations capture changes in the radiation budget—the balance between Earth’s incoming and outgoing energy—that controls the planet’s temperature and climate.

The previously unknown changes in the radiation budget are two to four times larger than scientists had believed possible. The reason why and the degree to which it changed are surprising scientists and create a powerful new test for climate models.

Inspired by this puzzle, a research group at NASA Goddard Institute for Space Studies (GISS) developed a new method of comparing the satellite observed changes to other meteorological data.

"The new method is a conceptual breakthrough in how we analyze data," said Anthony Del Genio, a scientist at GISS and co-author of the companion paper.

- more -

"What it shows is remarkable," said Wielicki. "The rising and descending motions of air that cover the entire tropics, known as the Hadley and Walker circulation cells, appear to increase in strength from the 1980s to the 1990s. This suggests that the tropical heat engine increased its speed."

The faster circulation dried out the water vapor that is needed for cloud formation in the upper regions of the lower atmosphere over the most northern and southern tropical areas. Less cloudiness formed allowing more sunlight to enter and more heat to leave the tropics.

In response, several of the world's top climate modeling research groups agreed to take on the challenge of reproducing the tropical cloud changes. But the climate models failed the test, predicting smaller than observed variability by factors of two to four.

"It's as if the heat engine in the tropics has become less efficient using more fuel in the 90s than in the 80s," said Wielicki. "We tracked the changes to a decrease in tropical cloudiness that allowed more sunlight to reach the Earth's surface. But what we want to know is why the clouds would change."

The results also indicate the tropics are much more variable and dynamic than previously thought.

"The question is, if this fluctuation is due to global climate change or to natural variability," said Del Genio. "We think this is a natural fluctuation, but there is no way to tell yet."

While the current 22-year radiation budget record—the longest and most accurate ever compiled—is still too short to pinpoint a cause, the newly discovered change acts as a standard by which to measure future improvements in cloud modeling.

"A value of this research is it provides a documented change in climate and a target for climate models to simulate," said Del Genio.

- end -

Images are available on the Internet in high resolution at:
http://asd-www.larc.nasa.gov/ceres/ASDceres.html